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PHYSICAL AND CHEMICAL OCEANOGRAPHIC DATA. UMPQUA RIVER ESTUARY, OREGON. PART I: DECEMBER 14-15, 1960

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Public Health Service
Portland, Oregon

January 1961

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PHYSICAL AND CHEMICAL OCEANOGRAPHIC DATA

UMPQUA RIVER ESTUARY

OREGON

Part I: December 14-15, 1960

by
Richard J. Callaway

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FWPCA - Reference Service
633 Indiana Avenue, N.W.

UNITED STATES DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Public Health Service
Water Supply and Pollution Control Program
Region IX, Portland, Oregon
January, 1961

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ABSTRACT

Oceanographic data collected in the Umpqua River Estuary, Oregon, during the period December 14-15, 1960, are tabulated. Temperature, salinity and velocity were measured from the surface to the bottom at approximately five-foot intervals at four stations in the estuary. Oxygen samples were collected at depth on four occasions.

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INTRODUCTION

As part of the U. S. Public Health Service's program of water supply and pollution control investigations in the Pacific Northwest, a monthly survey of oceanographical conditions in the Umpqua River Estuary, Oregon, began on December 14, 1960. The objectives of this oceanographical program have been described by Callaway (1960). Methods of data collection, tabulations of the data, and accuracy of the data are described below, although no physical interpretation is attempted.

STATIONS

The stations occupied are shown in Fig. 1. The station at Barrett's Landing was sampled hourly over a half-tidal cycle in order to determine (approximately) river runoff volume during the course of the survey.

DATA COLLECTED

Temperature: Temperature data were obtained using a Chesapeake Bay Institute conductivity-temperature indicator (Schiemer and Pritchard, 1957) on loan from the Oregon Fish Commission. The accuracy of these data should be about $\pm 0.1^{\circ}C$.

Salinity: Salinity data were obtained using the CBI conductivity-temperature indicator. The accuracy of these data should be about $\pm 0.1^{o}/oo$.

Dissolved Oxygen: The Alsterberg modification of the Winkler determination for dissolved oxygen was used. The accuracy of these data should be about ±0.1 ppm. The analyses were made by chemists of the Oregon State Sanitary Authority in Portland, one to two days after the collection of the samples.

Velocity: The modified Jacobsen current drag described by Pritchard and Burt (1951) was used to determine velocity. These data should be accurate to ±0.05 ft. per second.

TIDES

The predicted tidal curves for the Umpqua River entrance and Reedsport are shown in Fig. 2, for December 14-15, 1960.

PERSONNEL

In addition to the author, Messrs. Earl Kari and John Wilson, U. S. Public Health Service, Portland, and Mr. Glenn Carter, Oregon State Sanitary Authority, Portland, participated in the field work.

ACKNOWLEDGEMENTS

Dr. Wayne V. Burt, Department of Oceanography, Oregon State College, furnished equipment and the facilities of his laboratory. Dr. Burt and Mr. Bruce McAlister, Research Associate in Oceanography, have also provided valuable information and assistance in the establishment of this office's oceanography program.

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1960. Prospectus for an oceanographical investigation of the Umpqua River Estuary and related studies on the Umpqua River Basin. Mimeographed report, U. S. Public Health Service, Portland, Oregon.

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1951. An inexpensive and rapid technique for obtaining current profiles in estuarine waters. Journal of Marine Research 10, 2, pp. 180-189.

Schiemer, W., and Pritchard, D. W.

1957. The Chesapeake Bay Institute conductivity-temperature indicator (CBI-CTI). The Johns Hopkins University, Chesapeake Bay Institute, Tech. Dept. XII, Ref. No. 57-1. (Unpublished manuscript.)

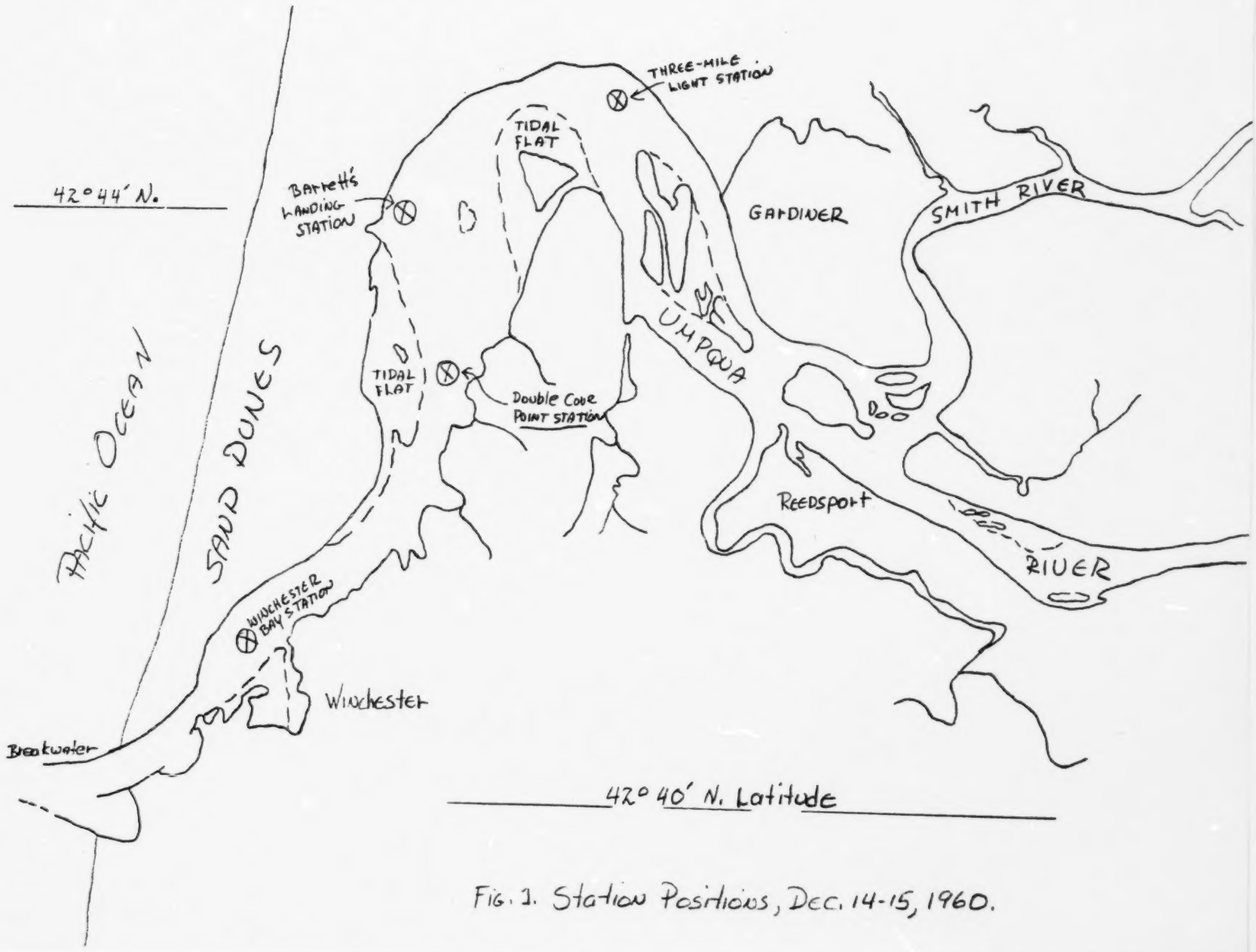

FIG. 1. Station Positions, Dec. 14-15, 1960.

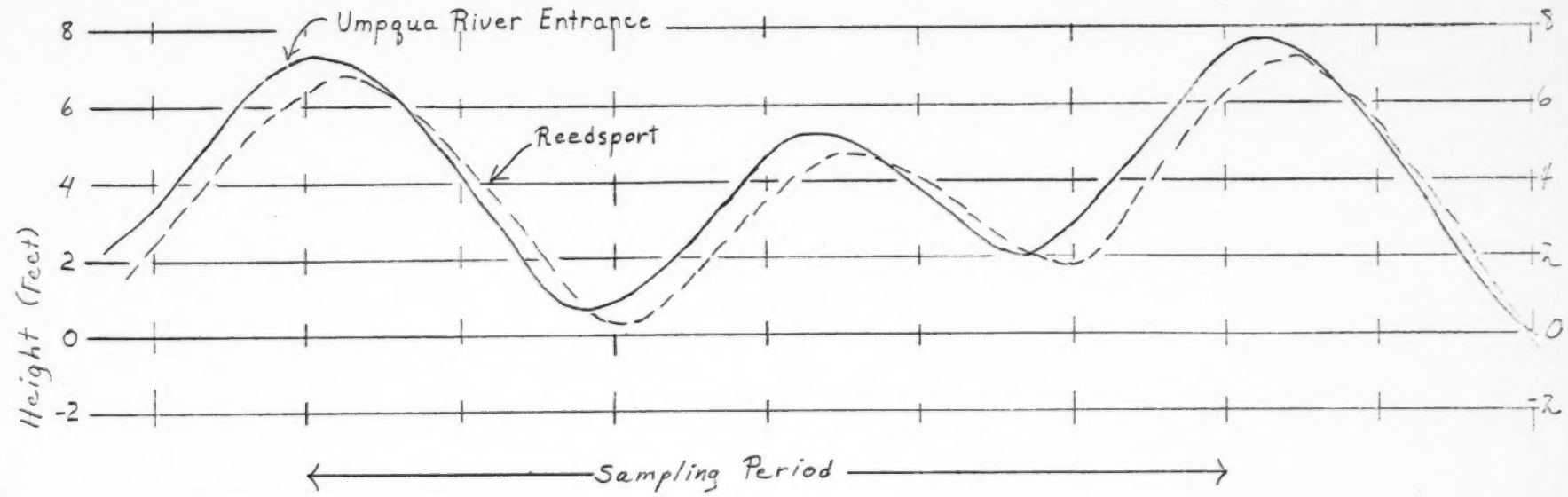

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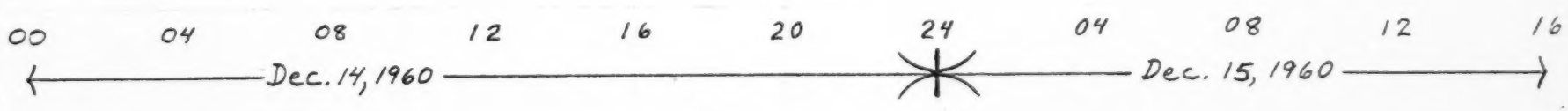
Fig. 2 Predicted Tides, Entrance and Reedsport



STATION: Winchester Bay DATE: December 14, 1960

TIME:	0807		0842			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.5	27.6	0	0.6 F		
5	11.0	29.6	5	1.1		
10	11.0	29.8	9	1.2		
15	11.1	30.0	14	1.1		
20	11.0	30.0	19	1.1		
25	11.1	30.0	23	1.3		
30	11.1	30.0	26	1.4		
35	11.1	30.1	32	1.3		
38	11.1	30.1	36	1.1		

STATION: Winchester Bay DATE: December 14, 1960

TIME:	0907		0912			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.7	29.2	0	0.0		
5	10.8	29.8	5	0.3 E		
10	11.0	30.2	10	0.4		
15	11.0	30.3	15	0.0		
20	11.0	30.3	20	0.8 F		
25	11.0	30.3	25	0.7		
30	11.0	30.3	29	1.0		
35B	11.0	30.3	34	0.9		

STATION: Double Cove Point DATE: December 14, 1960

TIME:	0944		0932			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	9.4	22.3	0	0.0 S		
5	10.7	28.8	5	0.0		
10	10.8	29.4	10	0.0		
15	10.9	29.7	15	0.0		
20	10.9	29.7	20	0.0		
27B	10.9	29.8	25	0.0		
			28	0.0		

STATION: Winchester Bay DATE: December 14, 1960

TIME:	1007		1021			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.5	28.5	0	1.7 E		
5	10.9	30.0	4	1.9		
10	10.9	30.3	7	1.8		
15	10.9	30.4	11	1.9		
20	10.9	30.4	18	1.3		
25	10.9	30.5	23	1.2		
30	11.0	30.5	26	0.9		
32B						

STATION: Double Cove Point DATE: December 14, 1960

TIME:	1042		1036			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	9.4	21.1	0	1.9 E		
5	9.9	24.6	5	1.1		
10	10.6	28.6	10	1.0		
15	10.6	28.8	14	1.0		
20	10.7	29.3	19	1.0		
25	10.8	29.4	23	0.8		
26B						

STATION: Winchester Bay DATE: December 14, 1960

TIME:	1007		1102			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.0	24.6	0	3.1 E		
4	10.3	27.0	3	2.8		
9	10.5	28.5	6	2.6		
13	10.8	29.3	11	2.1		
17	10.8	29.6	16	1.9		
22	10.9	29.8	21	1.9		
25	10.9	29.9	25	1.8		
			28	1.7		

STATION: Double Cove Point DATE: December 14, 1960

TIME:	1158		1148		1129	
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.6	16.8	0	1.1 E	3	10.2
5	8.7	17.1	4	1.1	8	10.3
10	8.7	17.2	8	1.1	13	9.4
15	9.4	21.9	12	1.2	18	9.3
20	10.2	26.6	18	0.9		
22B	10.5	----	21	0.7		

STATION: Winchester Bay DATE: December 14, 1960

TIME:	1207		1232			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.7	23.1	0	> 4.0 E		
5	9.4	----	4	2.4		
9	10.0	26.6	8	2.6		
13	10.2	27.2	12	2.4		
18	10.2	27.2	18	2.4		
22	10.3	27.4	23	2.3		
26	10.3	27.5				
30	10.3	27.6				

STATION: Double Cove Point DATE: December 14, 1960

TIME:	1332		1325			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.8	13.8	0	3.5 E		
5	8.3	15.5	5	2.7		
9	8.5	16.3	9	2.2		
14	8.5	17.0	14	2.0		
20	8.9	18.7	19	2.0		
24	9.2	21.0				

STATION: Double Cove Point DATE: December 14, 1960

TIME:	1417		1412			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.5	10.4	0	2.5 E		
5	7.8	12.4	4	2.4		
10	8.0	13.4	9	2.2		
15	8.1	14.2	14	2.0		
20	8.3	15.2	20	1.9		

STATION: Barrett's Landing DATE: December 14, 1960

TIME:	1437		1432			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.9	6.3	0	2.9 E		
5	7.0	7.5	4	2.7		
9	7.2	8.2	8	2.5		
14	7.2	8.6	12	2.6		
18	7.2	9.0	17	2.4		
23	7.3	9.1	21	2.4		
27	7.3	9.1	26	2.4		
32	7.2	9.1	32	2.3		

STATION: Double Cove Point DATE: December 14, 1960

TIME:	1512		1507			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.2	8.8	0	2.5 E		
5	7.6	11.2	4	1.8		
10	7.7	11.8	9	1.6		
15	7.9	12.6	15	1.5		
20	7.9	12.9				

STATION: Barrett's Landing DATE: December 14, 1960

TIME:	1532		1527			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.7	5.6	0	2.4 E		
5	6.8	6.2	4	2.0		
10	7.0	7.0	8	1.9		
15	7.0	7.0	13	1.9		
20	7.2	8.6	17	1.7		

STATION: Double Cove Point DATE: December 14, 1960

TIME:	1555		1547			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.0	7.5	0	1.7 E		
5	7.1	7.5	4	1.8		
10	7.5	10.6	10	1.4		
15	7.7	11.5	15	1.2		
20B	7.8	12.3	18	0.0		

STATION: Barrett's Landing DATE: December 14, 1960

TIME:	1702		1707			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.4	4.3	0	0.0 S		
5	6.4	4.5	5	0.0		
10	6.6	5.4	10	0.0		
15	6.8	6.2	15	0.0		
20	6.8	6.4	20	0.0		
25	6.9	6.9	25	0.0		
30	7.0	7.3	30	0.0		
35	7.1	7.6	35	0.0		
40	7.1	7.7	40	0.0		
45	7.1	7.8	46	0.0		
50	7.1	7.8				

STATION: Double Cove Point DATE: December 14, 1960

TIME:	1747		1737			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.3	9.1	0	0.7 E		
5	7.5	10.4	5	0.3		
10	7.8	12.0	10	0.0		
15	8.0	13.2	15	0.0		
20	8.3	15.0	20	0.0		
21B	8.3	15.0	23	0.8 F		

STATION: Barrett's Landing DATE: December 14, 1960

TIME:	1849		1842			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.9	6.8	0	1.8 F		
5	7.6	10.6	4	1.9		
10	7.6	10.8	8	1.9		
15	7.7	11.5	12	2.0		
20	7.8	11.8	16	1.9		
25	7.8	12.4	20	2.0		
29	7.8	12.4	26	1.8		

STATION: Double Cove Point DATE: December 14, 1960

TIME: 1933 1927

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.3	15.8	0	3.4 F		
5	8.3	15.4	3	2.8		
10	8.4	16.2	5	2.8		
14	8.6	17.0	8	2.8		
20	8.7	17.2	12	2.5		
25	8.7	17.4	18	2.1		

STATION: Barrett's Landing DATE: December 14, 1960

TIME: 2020 2014

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.6	11.0	0	0.0		
5	7.6	11.3	5	0.0		
10	8.1	13.5	10	1.0 F		
15	8.3	15.3	15	1.0		
20	8.4	15.4	20	1.5		
25	8.4	15.9	24	1.6		
30	8.4	16.1	28	1.7		
35	8.5	16.2	30	1.8		
40	8.5	16.2	36	1.8		
			40	1.6		

STATION: Double Cove Point DATE: December 14, 1960

TIME: 2113 2111

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	9.6	23.5	0	0.0		
5	9.9	26.5	5	0.0		
10	10.2	26.3	9	1.8 F		
15	10.6	28.5	15	1.5		
20	10.7	29.3	19	1.7		
25	10.7	29.3	25	0.0		

STATION: Barrett's Landing DATE: December 14, 1960

TIME:	2232		2227		2202	
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.5	16.8	0	0.0	0	10.5
5	8.6	18.3	5	0.0	5	10.1
10	9.4	22.6	10	0.0	10	9.9
15	10.1	26.6	15	0.0	15	9.9
20	10.4	27.7	20	1.2 F	20	9.4
25	10.4	27.8	25	1.3	25	9.4
30	10.4	28.0	30	0.0		
35	10.4	28.0				
40	10.5	28.1				

STATION: Double Cove Point DATE: December 14, 1960

TIME:	2325		2320			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.7	18.8	0	1.6 E		
5	8.9	19.9	5	1.5		
10	9.9	26.4	10	1.3		
15	10.7	29.3	15	1.1		
20	10.8	30.1	18	1.1		

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0122		0102			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.1	8.1	0	3.5 E		
5	7.4	9.3	4	3.1		
9	7.7	11.0	8	3.0		
14	7.8	11.6	13	2.9		
19	8.5	16.0	19	2.5		
24	10.0	27.0	25	2.4		
26	10.5	28.4				

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0207		0212			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.9	6.8	0	3.3 E		
5	7.2	8.0	4	2.8		
9	7.3	9.0	9	2.7		
14	7.4	9.9	15	2.4		
19	8.4	15.7	20	2.3		
24	9.5	23.2	23	2.2		

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0312		0305			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.7	5.6	0	2.5 E		
5	6.9	6.6	4	2.0		
10	7.0	6.8	9	1.8		
15	7.8	12.7	15	1.5		
20	8.0	13.5	20	1.4		
25	9.0	19.9				

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0412		0405			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.6	4.7	0	1.4 E		
5	6.7	5.5	5	0.5		
10	6.8	6.4	10	0.2 F		
15	7.8	11.8	15	0.3		
20	8.0	13.3	19	0.7		
25	10.3	26.7	23	0.5		

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0512		0507			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.7	5.5	0	0.0		
5	7.1	8.0	5	0.5 F		
10	7.5	10.8	8	1.0		
15	8.8	14.8	11	1.3		
20	9.6	22.9	12	1.5		
24	10.1	26.7	19	1.7		
29	10.2	27.2	21	1.9		
			24	1.9		

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0612		0607			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.0	7.5	0	1.7 F		
5	7.3	9.4	4	1.8		
10	8.2	15.0	9	1.8		
15	8.5	16.9	12	2.0		
19	9.4	22.4	15	2.1		
21	9.8	25.0	17	2.1		
			27	1.8		

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0705		0702			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.6	11.7	0	1.6 F		
5	8.5	17.0	5	1.6		
10	9.0	20.2	9	1.6		
15	9.4	22.2	13	1.8		
20	9.5	23.0	17	1.8		
24	9.3	24.9	20	2.0		
29	9.9	25.8	26	1.9		
32	9.9	25.8	29	1.9		

STATION: Winchester Bay DATE: December 15, 1960

TIME:	0807		0738		0750	
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	11.0	31.3	0	3.1 F	0	8.9
5	11.0	31.4	4	3.2	4	9.0
10	11.0	31.4	7	3.3	8	8.7
14	11.0	31.5	12	3.1	12	8.9
19	11.0	31.5	15	3.2	16	8.8
23	11.0	31.5	19	3.2		
27	11.0	31.5	24	3.1		
32	11.0	31.5	30	2.9		
37	11.0	31.5	32	3.0		

STATION: Double Cove Point DATE: December 15, 1960

TIME:	0830		0827			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.7	30.2	0	2.8 F		
5	10.7	30.3	5	2.8		
10	10.8	30.3	10	2.6		
15	10.8	30.4	14	2.6		
20	10.8	30.4	20	2.4		
24	10.8	30.5	24	2.4		
29	10.8	30.5	30	2.2		
32	10.8	30.5				

STATION: Barrett's Landing DATE: December 15, 1960

TIME:	0912		0850		0857	
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	----	----	0	1.5 F	20	9.1
5	10.3	27.8	5	1.6	25	9.2
10	10.4	27.9	10	1.6	30	9.0
15	10.4	28.4	15	1.6	35	9.1
20	10.4	28.6	19	1.6	40	9.1
25	10.5	28.8	21	1.9		
30	10.5	28.9	24	1.9		
35	10.6	29.3	29	1.9		
40	10.6	29.3	34	1.9		
			38	1.9		

STATION: Three-Mile Light DATE: December 15, 1960

TIME:	0937		0932			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.1	15.7	0	0.0 S		
5	8.4	17.1	5	0.0		
10	9.4	22.6	10	0.0		
15	9.5	23.4	15	0.0		
20	9.5	23.4	20	0.0		
25	9.6	23.8	25	0.0		
30	9.6	23.9	30	0.0		
			32	0.0		